The Role of Early Supplier Involvement on Performance of Agricultural Projects of Tana and Athi River Development Authority, Kenya

Koech David[1], Gumboh Jack[2], Kibuine M. Karei[3],
St. Paul's University

Abstract

Early supplier involvement is a strategy adopted by buyers in order to forge close relationships for purpose of surviving stiff competition emanating from heighted pressure of globalization, technological advancement and social changes that gradually diminish firm's market share. This phenomenon motivated the study that was conducted at Tana and Athi River Development Authority (TARDA)which is associated with production of hydroelectric power as well as water resource management along the seven forks dam and Athi basin but also involve itself in additional income generating activities. These activities are not among their core business and therefor require early supplier involvement is because of complex ecosystem. Among TARDA stakeholders are their suppliers who have a key role in the entire supply chains of farming activities and early supplier involvement (ESI) is critical in delivering the objective of the authority. This motivated the study which investigated on the relationship between early supplier involvement and performance of agricultural projects of TARDA. The study was guided by the following general objectives; to determine the relationship between early supplier selection and performance. Descriptive and cross-sectional research designs were applied in determining the relationship between independent and dependent variables. The target population was 90 employees of the authority constituting the senior management, departmental managers, supervisors and store clerks. The data collection instrument was structured questionnaire and data analysis consisting of descriptive analysis such as percentages, means, standard deviation and frequencies. To predict the relationship of independent and dependent variables, a regression model was used in order to determine the extent to which early supplier involvement explains the performance of TARDA. The results found that supplier selection and supplier relationship management enhance the business stability of agricultural projects of TARDA. Predictive analysis showed that supplier relationship management had a significant positive relationship on performance. The study suggested enhancement of supplier selection and supplier relationship management strategies in TARDA so as improve on performance of agricultural projects. The study recommends future studies using otherl research design to establish early supplier involvement on performance of agricultural projects of TARDA.

Key words: Early Supplier involvement, supplier selection, supplier relationship management and performance of agricultural projects.

1.0 Introduction to the Study

TARDA is state agencies that receives funding from the Government of Kenya to generate electricity and generates own revenue from other projects such as farming and agro processing of inputs from honey, rice and dairy Tarda (2018). This funding enables the agency to run its activities and contribute to the National Development as is required of all

agencies funded by taxpayer. In the financial years 2021/22 and 2022/23 the exchequer allocation to TARDA was Ksh 132.7 million and Ksh 160 million, which is equivalent to 6.6% and 8% of the national budget respectively (National Treasury of Kenya, 2022). TARDA, just like any other organization, are subjected to competition from firms and individuals engaged in agricultural production. Hamid (2006), explains that globalization has led to increased competitiveness for limited resources and markets, with local industries facing stiff competition from foreign companies especially multinationals. Broadly, literature reviewed indicated that studies on ESI and performance has concentrated on manufacturing firms, where procurement of tangible products at a point in time is key while similar engagement in complex processes such as farming is lacking. Equally, Kiggundu (2018) investigated ESI and organisational performance in a manufacturing company: a case study of Mukwano industries, Kampala-Uganda. Oyola, (2017) researched on, the support system for the management of early supplier participation in new product development, with the aim of providing a set of recommendations for engaging suppliers' efficiency in early stages of product development. Kimwaki (2022) investigated on ESI and the supply chain performance in food and beverage processing companies in Kenya.

The general objective of the study was to investigate the role of ESI and performance of agricultural projects of TARDA.

The secondary objectives were;

i. To determine the relationship between supplier selection and performance of agricultural projects at TARDA, Kenya
ii. To determine the relationship between supplier relationship management and performance of agricultural projects at TARDA, Kenya.

1.1 Tana and Athi Rivers Development Authority

The Tana and Athi Rivers Development Authority (TARDA) is a state corporation established in 1974 by an Act of Parliament CAP 443 of the Laws of Kenya. Its functions and responsibilities include the integrated planning and coordination of all development projects within the Tana-River Basins. It is also charged with the responsibility of implementing projects for the purpose of utilizing and protecting the water catchment areas feeding river basin and soil resources management (TARDA, 2022). The river basins are among the most valuable natural resources in Kenya that range from water, fertile land, forests, wildlife,

minerals, to other natural resources. This offers an opportunity for the country to enhance socio-economic development by utilising the resources for the benefit of communities living along the river basin. In the mid-1970s, the government adopted a river-based development approach that was inspired by the success of the Tennessee Valley Authority in the United States (TARDA strategic plan, 2019 – 2023).

Apart from basin management and environmental conservation, TARDA has projects that help in generating income and contribute to food security among communities living in the drainage area of the two rivers. Examples include rice farming in Tana delta, green grams in Kiambere, vegetable farm at Masinga and livestock farming at Emali where they develop and sell hybrid breed livestock to the community as a way of empowering people with quality livestock breeds. The authority also has projects dealing in hospitality industry where two resorts that offer accommodation and conference facilities have been established at Masinga Dam Resort and Tana Delta Resort (TARDA, 2022). TARDA also helps communities within counties by providing expertise to assist in irrigation projects that supply water to farms and constructing water pans in to help communities mitigate droughts. It also creates awareness among local communities on the effects of climate change, supplies and plants certified tree seedlings and conservation of water catchment areas. TARDA's jurisdiction covers a vast area of approximately 138,000 km^2, including 100,000 km^2 of the Tana Basin and 38,000 km^2 of the Athi Basin. This area represents about 25% of the total land mass of Kenya and spans across 19 counties. According to the 2009 census, the population under TARDA's was estimated at 11 million people, which accounts for about 37% of the national population of Kenya projected at 15 million (TARDA strategic plan 2019 – 2023).

1.1.1 Early Supplier Involvement

According to Sarkar, Ullah, & Kim, (2017) the engagement between suppliers and their customers in co-designing and developing new products, in exchange for a mutually beneficial relationship at all levels is referred to as ESI**.** ESI enables organizations to engage suppliers early by involving them in product research, early supplier selection, supplier relationship management, and timely procurement of inputs (Mandal, 2022). Moreover, ESI assumes a crucial role in nurturing collaborative efforts within the manufacturing and production sectors, allowing organizations to develop suppliers right from the onset by integrating them in product design and facilitating prompt material acquisition (Fiati, 2019).

ESI of automated companies in America led to improved company performances, through product competitive prices, on time delivery as well as improved product quality (Oktapia, *et al*, 2022). The ESI strategy supports success in product development and can be used to advance competitive advantage. Consequently, it is important to engage suppliers early in the process of design and development, by incorporating their capabilities, knowledge and skills (Manavalan, & Jayakrishna, 2019). While Japan has witnessed progress in ESI within sectors such as automotive and electronics during the product development phase, many companies grapple with significant challenges on effective management of the same (Zidane & Olsson, 2017). Notably, the adoption of ESI leads to enhanced efficiency in New Project Development (NPD) initiatives, with reduced development costs, design alterations, and engineering hours, and increase in quality output Baliga *et al*. (2020).

ESI is a complex process that cannot be easily implemented, given the myriads of internal and external variables that need to be considered for successful execution. Gaining competitive advantage through supplier engagement in new product development necessitates the establishment and maintenance of suitable procedural frameworks, alongside collaboration with suppliers possessing complementary expertise in product development ventures (Kouhizadeh, Saberi, & Sarkis, 2021). Thus, it’s important to examine the scope of supplier involvement and define the specific roles in accordance with expectations in order to ensure the overall project's success (Singh, Garg, & Sachdeva, 2018).

Furthermore, the extent of incorporation in a project is significantly influenced by the project's level of modernization. This holds true for both minor and major innovation projects, where the integration of suppliers should be optimized for maximum effectiveness. Consequently, the degree of supplier involvement fluctuates based on a variety of factors. Among these is the need for NPD managers to comprehend the diversity in perspectives that arise with integration warranting a selective approach (Taylor, Vreugdenhil, & Schneiders, 2017). According to Mandal (2022), ESI empowers organizations to engage suppliers early enough through activities like product research, early supplier selection, supplier relationship management, and prompt material procurement. This proactive approach can yield successful outcomes in new product development.

Kiggundu (2018), highlights that practicing ESI encourages the exchange of knowledge, experiences, technical skills, information and technological capabilities. Significant

advantages and benefits can be achieved through ESI in the process of developing customer's product. On the other hand, Sikuku (2018), explains that ESI plays a vital role in guaranteeing that organizations fulfil their objectives not only in procurement of goods and services but also in strategic sourcing. In regard to the same view, Kimwaki (2022) emphasized the significance of ESI for purpose of minimizing lead times, thereby significantly augmenting the reliability and level of customer contentment among food and drinks processing companies in Kenya.

1.1.2 Organizational Performance

Performance relates to the outcomes of activities influenced by both the operational effectiveness and the organizational structure. These outcomes are often displayed through indices of market share, revenue, profits, as evident from company's financial reports (Mohammed, 2014). Companies that excel in performance are capable of consistently generating substantial profits, enhance job creation, and increase individual and organizational income (Taouab, 2019). Some of the indicators of organizational performance include efficient inventory management, profit optimization, quality assurance, low product rejection, and decreased operational expenses. In this context, product development can be seen as an opportunity for enhancing a firm's competitiveness (Source?).

Measurement of organizational performance is varied and dependent on the vison and mission of the entity but if private businesses it can be assessed through operational metrics such as the value of the operating cycle, return on asset and equity and asset replacement (Azim, *et al*., 2015). In manufacturing firms, operational efficiency is gauged through variables such as product of high-quality goods, ensuring customer contentment, meeting delivery schedules, and showcasing adaptability (Tarigan *et al.*, 2021). Furthermore, other aspects considered include expense reduction, savings, efficient inventory management, quality assurance, and a decreased occurrence of product rejections.

2.0 Literature Review

Resource dependence theory and agile supply chain model were found to be suited to support the study in line with tenets of deductive approach to research which has been adopted by the study**.** Wachiuri (2015) and Ochieng (2014) explains the idea of anchoring research on a theory because it provides means by which a set of interconnected concepts can

be conceptualized to explain an existing or emerging issue that is not well understood. This view is supported by Kombo, K. D.& Tromp, D. L. A. (2006) by who observe that an underlying theory can help in generating new ideas.

2.2.1 Resource Dependence Theory (RDT)

Resource Dependence Theory (RDT), initially introduced by Pfeffer and Salancik in 1978, investigates the influence of external resources on an organization's performance. Early engagement with suppliers has emerged as a crucial component of both strategic and operational management for businesses. However, it wasn't until the 1970s that a formal theory was developed to analyse the significance of this engagement. The emergence of RDT was solidified through the release of "The External Control of Organizations: A resource dependence perspective" by Halbesleben, Neveu, Paustian-Underdahl, & Westman, (2014). This theory carries implications for the effectiveness of buying firms, particularly concerning how they leverage their relationships with suppliers as essential and reliable resources.

Hence, the resource dependence theory supports, the concept of supplier selection, because it suggests that organizations lacking essential resources forms partnerships with other entities to acquire them. In this context, buyers rely on the suppliers for external resources, while vendors depend on the customers to access the markets. Furthermore, institutions look forward to modifying these dependency relationships by either reducing their own dependency on external entities or by increasing other organizations' dependency on them (Halbesleben *et al.,* 2014). From this view, organizations are viewed as collaborators that adapt their structures and behaviours to acquire and retain external resources. Obtaining the necessary external resources for an organization involves diminishing its reliance on external parties and/or enhancing the dependence of others on it, potentially reshaping the power dynamics between organizations.

The theory is applicable to the study of early supplier involvement (ESI) because it emphasizes how organizations manage, mitigate uncertainty and enhance supply chain stability. By fostering strong collaborations with suppliers through ESI, firms can secure critical resources, improve adaptability, and reduce vulnerabilities in their supply chains.

2.2.2. The Agile Supply Chain Model

The agile supply chain model was introduced in 1991 by Lehigh University's Iaccoca Institute. Manufacturing agility places its focus on the capacity to react swiftly to unpredictable market demands, surrounding changes in both capacity and diversity of products. The origins of the concept of agility in business can be linked to flexible manufacturing systems. Manufacturing agility revolves around reducing lead times and has proven effective particularly when, market demand remains uncertain and product life cycles are short. (Ivanov *et al.,* 2017). According to Uitto, M., Jokikokko, K. & Estola, E. (2015)**,** supply chain agility possesses a strong ability to embrace compliantly to rapidly changing environments, making it well-suited to achieving high levels of customer satisfaction.

Oliveira-Dias, D., Maqueira, J.M. & Moyano-Fuentes, J. (2022) describe the agility as the successful pursuit of competitive advantage in terms of adaptability, the speed, creativity, forward-thinking, excellence, and financial success. This is achieved by combining adaptable resources and embracing.the best practices within an environment abundant in knowledge, all aimed at delivering customer-centric products and services within a rapidly evolving market. Bhamu and Singh (2014) argued that agile Supply Chain Model facilitates early supplier involvement (ESI), fostering better collaboration and communication which can lead to improved product development, adaptability to changing market demands and reduced lead times. Additionally, Kamalahmadi and Parast (2016) stress that agility plays a crucial role in enabling early supplier involvement by enabling adaption to changes in product research and development and effectively manage external disruptions. Therefore, Agile Supply Chain Model guarantees early supplier involvement, significantly enhancing the supply chain's overall performance and success.

2.3 Empirical Review on Variable Relationships

In modern economies, business aim to improve organizational performance, by incorporating suppliers at start of product design, development and the launch into the market. This entails selecting suppliers early, involving them in product research and development and in gathering market intelligence to relation to availability on inputs for future expansion, substitutes and consumer behaviour. Literature review presented in this section the following subsections highlights the importance of ESI in these key areas of buyer supplier collaboration in business initiatives.

2.3.1 Supplier Selection and organizational Performance

Mukherjee (2017) explained that supplier selection involves the procedures through which organizations identify, assess, and establish contracts with suppliers. This process entails the identification and selection of a potential supplier with whom an organization intends to conduct business. The primary objective is to create a mutually beneficial and sustainable business relationship with a reliable supplier who can provide the best value for the investment. This is a crucial step that forms the basis for a long-term partnership and has a significant impact on the success or failure of a product. Additionally, ensuring the reliability of suppliers enhances flexibility of buyer's supply chain by reducing the risk of disruptions of supplies and consequently production. When executed correctly, supplier selection can help in the efficient utilization of resources, attainment of value for money and in revenues.

Supplier selection is a vital initial stage in designing new products for purpose of ensuring that suppliers can provide the necessary inputs in respect to the company's product and development needs (Günay *et al.,* 2019). Fiati (2019) researched on ESI pprocess – A case study for a Company, noted that several factors play a pivotal role in ensuring an effective supplier selection process. These are the supplier selection procedure itself, development and adaptation of a relationships, as well as the internal capabilities of buyer organization, such as the commitment of top management and the coordination across different internal functions.

In research by Mandal (2022), supplier selection is described as the process of identifying appropriate suppliers capable of delivering high-quality products or services in the required quantity and at an acceptable price. Nevertheless, in a competitive business landscape, the task of supplier selection can prove to be challenging for organizations. The study indicated that strategic decisions relating to supplier selection extend beyond the traditional criteria of cost, quality, and timeliness. Other factors that must be taken into account to establish an enduring supplier relationships include practices in quality management, long-term management strategies, financial stability, technological and innovative prowess, cooperative attitude of suppliers, their co-design capabilities, and innovative ways to reduce costs (Rahmiati, et al, 2021).

Krop and Iravo (2016) research findings highlighted that supplier selection exerts a substantial impact on the effectiveness of the procurement role which in turn affects the overall performance of a company directly. Due to this, the quality of products and services supplied influences the final product or service delivered to end customers. Manyega and Okibo (2015) study to evaluate on supplier selection and its effects on procurement performance of public institutions, reported that effective supplier selection represents a source of competitive advantage. The study noted that the variable impacts on the competitive performance of public institutions when executed competently. Employing a carefully managed and organized method for choosing suppliers guarantees that suppliers possess the requisite knowledge and skills for the task at hand and are developed to their fullest potential, leading to cost savings (incorporating expenses related to finances, minimizing delays, and preserving reputation expenses), enhanced quality, efficiency, and effectiveness. Abdollahi, *et al.,* (2015) provided evidence that efficient supplier selection can clearly improve an organization's future performance through the reduction of operational costs, enhancement of product quality, and the ability to respond quickly to customer demands.

When selecting suppliers, it's crucial to ensure that there is alignment between buyers (organizations) and suppliers regarding shared business ethics, consistent quality standards, and dedication to continuous improvement (CIPS, 2017). In the realm of procurement, involving user departments in defining specification of goods, services, or works required from suppliers has the dual benefit of clarifying supplier roles and facilitates the identification of appropriate suppliers. This process helps to establish strategic capabilities within the organization, ultimately contributing to enhanced organizational performance (Nair & Das, 2015).

The studies highlighted were based on private firm involved in manufacturing while project's such those of TARDA involves agricultural crop production and bee keeping which is neither crop nor animal production consequently creates a dilemma because the level of output cannot be ascertained similar to tangible goods. The input of both buyer and supplier in this case is only a probability because of other factors such as environmental and genetics.

2.3.2 Supplier Relationship Management and Organizational Performance

Schuh *et al.,* (2014) defines supplier relationship management as a structured approach for assessing suppliers who provide services, materials and goods to an organization. It involves evaluating the contribution of every each one of them to the organization's success as well as developing tactics and strategies to enhance organizational performance. The management of supplier relationships is a complex and challenging effort that requires a profound understanding of its nature, as well as ongoing monitoring and evaluation of active interactions involved (Oyola, 2017). Additionally, the same study found that establishing and keeping supplier relationships frequently requires significant investments from the purchaser's side. Since any relationship involves a mixture of differences and cooperation, every important involvement in the supplier relationship is therefore, likely to have complex consequences. Therefore, the significance of buyer-supplier relationships in a new product development (NPD) setting is emphasised by showing that the attainment of shared competitive benefits over a period of time is positively correlated to the functioning and improvement of the relationship (Jap, 2001).

In this context, the proficient handling of supplier relationships is of paramount importance, because it has a potential of enhancing the performance of the purchasing organization, (Oyola, 2017). Proper management of supplier relationships can create significant competitive advantages, enhance the supply chain, and increase profitability. Supplier relationships are among the most important assets of a company, and they should be treated with similar logic to other types of investments. By investing in and effectively overseeing these relationships, businesses can guarantee a consistent supply of top-notch materials, minimize disruptions in their operations, and promote innovation and collaboration with their suppliers. According to Hamid (2016), supplier performance determines the supplier's capability to successfully meet manufacturer's requirements, such as providing high-quality products from the correct source and within the specified timeframe, while keeping delivery damages minimal. In contrast, production performance gauges the producer's ability to adhere to their customers' specifications which includes reduction of rework and production expenses, enhancement of outgoing product quality, reduction of work-in-progress, lowering of material handling costs, improvement of production efficiency and reliability, and the minimization of stock-outs. Additionally, eeffective assesmeant and management of supplier

and productivity can contribute to the delivery of top-notch products, efficient operations within the supply chain, and enhanced customer satisfaction.

According to O'Brien (2022) supplier relationship management refers to the systematic process of assessing vendors that supply an organization with materials, services and goods, and determining every role played to the success while using tactics that improve the performance. The aim of the study was to investigate the relationship between ESI and performance. On the other hand, Wachiuri (2015) conducted research to determine the impact of supplier development on the operational performance of the manufacturing sector in Kenya where focus was on the impact of financial support and firm involvement, for example East Africa Breweries Limited. This research narrowed down to investigating the relationship between ESI and performance of agricultural projects, which is different from Wachiuri (2015) where the focus was on the private sector that operates on different mission.

According to Mandal, (2022), firm performance is assessed based on the financial statements reported by the organization, which has the potential to yield substantial and enduring decision points that create employment opportunities and generate income for both individuals and organizations. Financial performance is determined by various indicators such as liquidity, financial activity ratios, solvency and profitability. In addition, development of new product is having a likelihood of to raising competitiveness from similar companies that react to potential reduction of their market share. Wang and Yang (2021) also suggest that the economic performance of a product and the operational effectiveness of the production environment play a role in determining firm performance relate when a new product is development.

2.4 Research gaps

Hamid (2016) conducted a study on impact of purchasing and ESI in a manufacturing firm in Malaysia. The aim was to identify the level of supplier involvement in a company that implements ESI and exploratory research design was used which implied that little was known about the variables. The findings indicated that implementing ESI enables a company to gain a competitive advantage in a highly competitive market. The study recommended that companies should prioritize ESI in product development process but suggested that quantitative studies were needed in future to ascertain the extant role of ESI on firm performance. Kiggundu (2018) investigated the influence of ESI on the performance of a

private manufacturing company in Uganda. This study examined the relationship between Early Supplier Involvement (ESI) and the performance of agricultural projects, which operate under different structures compared to private firms engaged in manufacturing.

Oyola (2017) studied on support system for managing ESI in developing new product that examined how managing the relationships with early suppliers in organizations can enhance optimal outcomes already existing in a company. The research approach was exploratory and qualitative in nature, while the current research used a descriptive and quantitative design to investigate the relationship between ESI and the performance of agricultural projects of TARDA, Kenya. Additionally, the study focused on developing a support system for managing ESI in new product development, whereas the current research designed at establishing the relationship between ESI and performance of agricultural projects.

Similarly, Meriläinen (2018) carried a study on development of ESI process – a case of a manufacturing company. The results indicated that implementing an efficient and systematic ESI process can shorten the design lead-times of new products, reduction in price of purchased inputs, and enhanced quality of products. The context of study was different from that of TARDA and therefore it was necessary to investigate the same variables for comparison because of market dynamics.

2.5. The Conceptual Framework

According to Kothari (2004) conceptual framework refers to a depiction, whether in written or visual form, of the anticipated relationships between variables, which are essentially the attributes or features being examined. In this study, ESI (independent variable) was represented by supplier selection and supplier relationship management. The organizational performance (dependent variable) was represented by cost reduction, savings, low inventory holdings and lower rejections as indicated in the conceptual framework. This study is determined to examine the effects of ESI on TARDA's organizational performance. Based on the study, the conceptual framework shows that there is a relationship between organizational performance and ESI.

Independent Variable

ESI

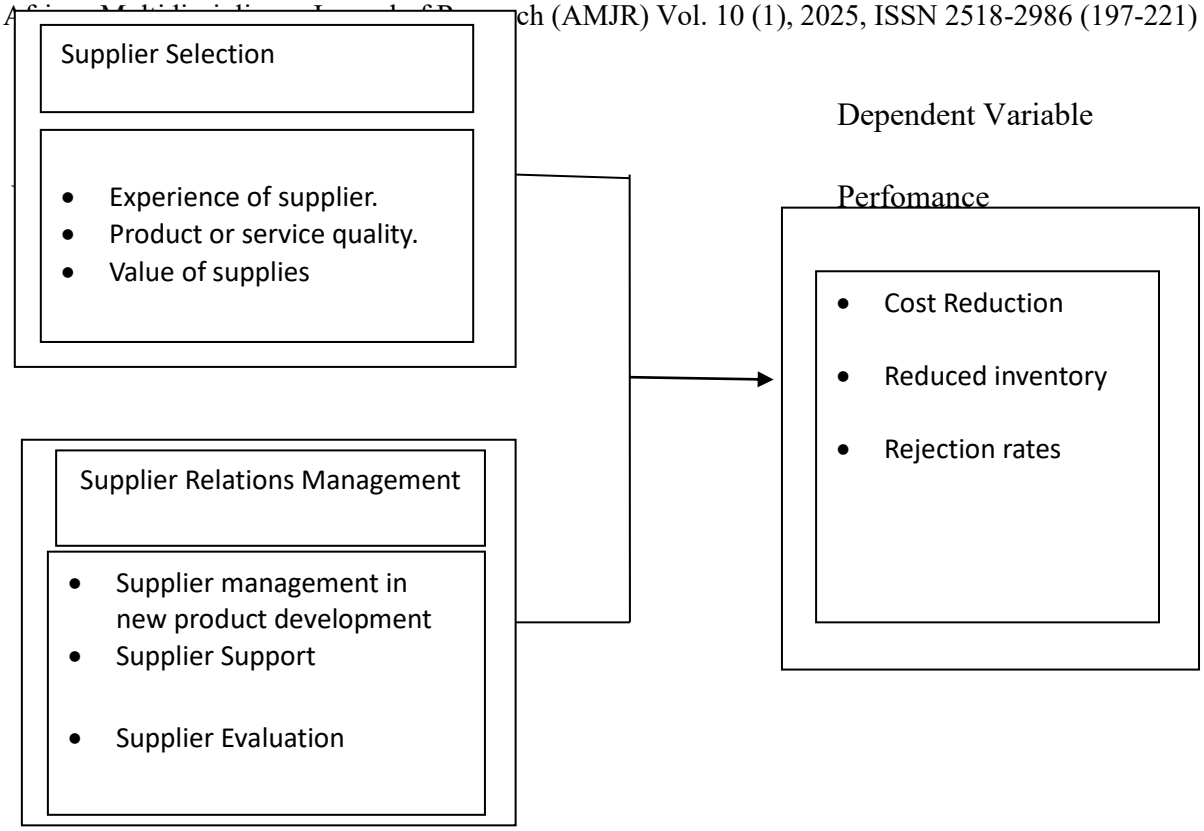

Figure 2-1Conceptual framework
Source: Research, 2024)

According to Saunders and Lewis, (2017) independent variable refers to the factors that the researcher explains variation in the dependent variable. The constructs of the dependent variable were selection of suppliers and supplier relationship management. Dependent variable refers to the outcome that a study attempting to predict or the solution to the problem originally identified. In this case the research focused on the organizational performance measured by indicators namely cost reduction, reduced inventory and rejection rates.

3.0 Research Methodology

The study adopted descriptive research design to examine the relationship between the variables under study. Kothari (2004) opine that the design enables collection of information about the current state of a problem under investigation as well as provide data that can be quantified for generalization purpose. Cross section design was also applied because data was collected within a short period of time from a target population of senior managers in project management, finance, and procurement, as well as clerks in the stores department TARDA head offices. This unit of observation was all the staff who had direct or indirect roles in procurement process because it was thought to possess information that could be relied on to make conclusions on the issue of investigation (Mugenda & Mugenda ,2003; Saunders &

Lewis, 2017). Finance department was included because it plays a vital role in supporting and facilitating ESI initiatives, through provision of financial assets, risk analysis, oversight, and strategic partnership. Whereas project departments contributed to success of early supplier development initiatives and the overall achievement of project goals by providing project-specific technical expertise in form of reports, risk management, and supports innovation efforts. A total of 90 respondents took part in the study and no sampling was done because total populations was relatively small. Table 3.1 below shows the distribution of the respondents according to departments from which they were drawn.

Table 3.1: Target population

			Category		
No	Target Group	Population	Finance	Procurement	TARDA Projects Teams
1.	Senior Managers	5	1	1	3
2.	Managers	11	2	2	7
3.	Supervisors	17	3	3	11
4.	Storekeepers Clerks	57	6	15	36
	Total	90	12	21	57

A structured questionnaire was used to collect data because it is cost-effective and enables collection of large data within a short period of time (Kothari, 2004). It is also less prone to bias, enhances confidentiality, integrity and data can be obtained with minimum interaction between researcher and respondent (Mugenda & Mugenda 2008).

Before the commencement of the actual data collection, a pilot study was conducted at Athi water service Board office headquarters Kiambu road Nairobi, where nine employees (10 percent of the target population) participated. Mugenda & Mugenda (2008) observes that sample size of between 1 to 10 percent is adequate for determining reliability of the data collection instruments. In addition, it helped to make improvements on the instrument and data collection procedures.

Descriptive statistics such as frequency, mean, standard deviation and percentages were used to describe sample characteristics and establish major patterns emerging from the data. The questionnaire was constructed using Likert Scale that facilitated in conversion of qualitative items to quantitative data (Mugenda & Mugenda, 2008). A multiple linear regression model was constructed and applied to determine contribution of the independent variable to the dependent variable. The model took the form of equation summarized as shown below;

$Y=\beta_0+ \beta_1X_1+ \beta_2X_2 + \varepsilon$

Y =Performance

X_1= Supplier selection

X_2 = Supplier Relationship Management

β_0 =Constant of the regression equation

β_1, β_2, β_3 and β_4= regression coefficients that will be estimated

ε = error term or disturbance term.

4.0 Research Findings and Discussion

Data relating to the dependent and independent variables was collected by use of a structure questionnaire where the statements were weighted by use of the questionnaire consisted of four sections where data concerning the variables was operationalized by use of a five –point Likert scale which represented disagree (1) and progressively to strongly agree (5).. Section A had questions that aimed at describing the demographics of the respondents while the rest of the sections described independent and dependent variables.

4.1 Response Rate

Table 4.1 below shows the response rate where 90 questionnaires had been sent out and 83 (92%) were responded to. The response rate was considered adequate, a position supported by Kothari and Garg (2015) who emphasized that a rate of 50% is adequate, 60% good, and more than 70% as exceptionally good for making conclusions. Therefore 92% was exceptional and was attained probably because all the respondents were housed in the same building.

Table 4.1: Response Rate

Category	Frequency	Percentage (%)
Responses	83	92
Non-Responses	7	8
Total	90	100

Source: Research Data 2024

4.2 Demographics of the Target Population

Section one of the questionnaire sought demographic I data regarding gender, the number of years worked in the organization and highest level of education attained. The results obtained were as presented in tables 4.2, 4.3 and 4.4, below.

Table 4.2: Gender of the Respondents

Gender	Frequency	Percent
Male	52	63
Female	31	37
Total	83	100

Source: Research data 2024

Table 4.2 above shows that 63 % of the respondents were male while 37% were female. This indicated that TARDA had more male employees compared to females. The second question required the respondents to specify the number of years worked for the organization and the responses were as shown in table 4.3 below.

Table 4.3: Work Experience of the Respondents

Work experience	Frequency	Percent (%)
Less than 5 years	10	12
6- 10 years	27	33
11- 15 years	22	27
Over 15 years	24	29
Total	83	100

Source: Research data 2024

As indicated in table 4.3 above, 33% of the respondents had been employed by TARDA for 6 to 10 years, 27% worked for between 11 and 15 years, 29% more than 15 years, while 12% of the had worked for less than 5 years. The findings demonstrate that the respondents had worked for the organization long enough to understand operations took place and therefore their responses could be relied on as a true reflection of the response obtained. According to Bryman and Bell (2017), long-term employees of a company or organization are better able to understand its dynamics and offer authoritative evidence for themes of the study.

Question three sought to find out the level of education of TARDA employees who took part in the study and the results are as indicated on table 4.4 below.

Table 4.4. Level of education

Work experience	Frequency	Percent (%)
Certificate holders	19	23
Diploma holders	36	43
Degree holders	25	30
Postgraduate degree holders	2	4
Total	83	100

Source: Research data 2024

From the findings presented in Table 4.4 above, 23% of staff were certificate holders, a majority (43%) had attained diploma as the highest level of education, 30% under graduate, while 4% were post graduate degree holders. Based on these results, it is evident that majority of respondents had diploma level of education. This can be attributed to the nature of work in TARDA which require operational skills as opposed to the conceptual. Processes of bee keeping, cabling electricity transmission needed operational effort or force to operating of machines as well as equipment.

4.3 Descriptive Analysis of Variables

Descriptive analysis was conducted to determine general trends of the variables that were operationalized by use of five-point Likert scale that contained responses on a range of 1 to 5 which represented disagree (1) and progressively to strongly agree (5). The results are summarized in tables 4.5 and 4.6 which provide means and standard deviation of items that sought to explain the processes supplier selection and supplier relationship management.

Table 4.5: Supplier selection and performance

Variables	N	Mean	Std. Deviation
We involve our suppliers in the supplier selection process	83	4.07	0.659
ESI in supplier selection enhances the financial stability of agricultural projects of TARDA	83	4.23	0.548
ESI in supplier selection enhances the business stability of agricultural projects of TARDA	83	4.34	0.501
ESI in supplier selection enhances Quality of supplies	83	4.33	0.471
ESI in supplier selection enhances reliability of supplies	83	4.27	0.471
ESI in supplier selection leads to a fair price	83	4.41	0.542
Average	83	4.275	0.532

Field data, 2024

Table 4.5 above indicates that the first statement had a mean(M) of 4.07 and a standard deviation (SD)of 0.659 which showed that majority of respondents agreed that they involved their suppliers in the supplier selection process. The mean (M)and standard deviation (SD) for the second statement was 4.23 and 0.548, respectively, which indicated that majority of those who responded thought that ESI in supplier selection enhanced financial stability of agricultural projects of TARDA. The third question had a M of 4.34 and SD of 0.501 which implied that most respondents agreed that ESI enhanced business stability of agricultural projects of TARDA. The M and SD for the fourth statement were 4.33 and 0.471, respectively. This showed that ESI in supplier selection enhanced quality of supplies. The mean and standard deviation for the fifth statement were 4.27 and 0.471, respectively. This meant that ESI in supplier selection enhanced reliability of supplies. Finally, ESI in supplier selection led to a fair price, with a mean of 4.41 and standard deviation of 0.542, which was interpreted to mean that majority of the respondents agreed with the statement. The overall mean of supplier selection was 4.275 and SD of 0.532 which indicated that respondents agreed that supplier selection enhanced financial and business stability, quality and reliability and it also led to leads to a fair price.

Next, means and standard deviations of statements of items that measured supplier relationship management of TARDA agricultural projects were determined and tabulated as shown in Table 4.6.

Table 4.6: Supplier Relationship Management and Performance

Variables	N	Mean	Std. Deviation
We promote good supplier relationship management	83	4.25	0.437
proper supplier relationship management promotes cost reduction of agricultural projects of TARDA	83	4.34	0.476
Good supplier relationship management enables product improvement of agricultural projects of TARDA	83	4.33	0.521
Good supplier relationship management enables process improvement of agricultural projects of TARDA	83	4.3	0.535
Proper supplier relationship management leads to low risk of agricultural projects of TARDA	83	4.23	0.423
Proper supplier relationship management leads to low price volatility of agricultural projects of TARDA	83	4.24	0.484
Average	83	4.28	0.479

Field data, 2024

The first statement had a mean of 4.25 and a standard deviation of 0.437, which showed that majority of the respondents were in agreement that, TARDA promoted good supplier relationship management. The mean and standard deviation for the second statement were 4.34 and 0.476 respectively, which implied that majority of respondents thought that proper supplier relationship management led to cost reduction in activities of the projects. The Third question had a mean of 4.33 and a standard deviation of 0.521, indicating that most respondents agreed that good supplier relationship management enabled product improvement. The mean and standard deviation for the fourth statement were 4.3 and 0.535 respectively. This showed that good supplier relationship management enabled process improvement. The mean and standard deviation for the fifth statement were 4.23 and 0.423, respectively, which implied that proper supplier relationship management lowered risks encountered and, finally, proper supplier relationship management led to low price volatility of the agricultural project's activities. The mean for this statement was 4.24 and the standard deviation 0.484. The overall descriptives for all the items had a mean of 4.28 and SD of 0.479 and the findings showed that supplier relationship management plays an important role

Table 4.7: Performance of TARDA Projects

Variables	N	Mean	Std. Deviation
ESI leads to a low-cost reduction	83	4.25	0.437
ESI promotes low inventory holding	83	4.39	0.49
ESI leads to product quality control	83	4.35	0.504
ESI leads to an increase in organizational profit and savings	83	4.37	0.487
ESI leads to low rejections	83	4.3	0.462
Average	83	4.33	0.476

Field data, 2024

The first statement had a mean score of 4.25 and a standard deviation of 0.437, which showed that majority of the respondents agreed that ESI led to a low-cost of the projects, activities. The mean and standard deviation for the second statement were 4.39 and 0.49, respectively, which implied that, majority of those targeted agreed that ESI resulted in lower inventory holding. The third question had a mean of 4.35 and a standard deviation of 0.504, indicating that most respondents strongly agreed that ESI leads to product quality control. The mean and standard deviation for the fourth statement were 4.37 and 0.487, respectively. This shows that ESI leads to an increase in organizational profit and savings. Finally, the

mean and standard deviation for the fifth statement were 4.3 and 0.462, respectively, which implied that respondents strongly agreed that ESI leads to low rejections. The effects of ESI on performance of TARDA projects, had an SD of 0.476 and an overall mean of 4.33. This suggests that ESI plays an important role on performance, which accounts for the variation in performance of agricultural projects at TARDA.

4.4 ESI on Performance of Agricultural Projects at TARDA

Analysis of ESI on performance of agricultural projects of TARDA was conducted by use of a multiple linear regression model in order to predict the extent to which the independent variable explained the dependent variable. The analysis began by determining whether ESI had a linear relationship with performance by calculating Pearson's Correlation coefficient**.** The coefficient ranges between -1 to +1 where the negative sign implies that the variables have a linear relationship but in an opposite direction. When Pearson's coefficient sign is positive it means that when the independent variable increases dependent variable increases and when negative both variables decrease in the same direction. When the coefficient is zero or close to zero, the variables have no significant relationship. Pearson's correlation was determined, and findings indicated on Table 4.11.

Table 4.8: Correlations Matrix

		Early supplier selection	Supplier relationship management	Organizational Performance
Early supplier selection	Pearson Correlation	1	0.121	0.264
	Sig. (2-tailed)		0.275	0.016
	N	83	83	83
Supplier relationship management	Pearson Correlation	0.121	1	0.464
	Sig. (2-tailed)	0.275		.000
	N	83	83	83
	Sig. (2-tailed)			
	N			

Table 4.8 above indicates that early supplier selection had a linear positive relationship with performance (r =0.264, p = 0.016).

After establishing a linear relationship between constructs of independent and performance was established. Prediction of the relationship was determined by running a regression

analysis and the results were recorded in the table 4.8 which shows fitness of the model, and coefficients of supplier selection and supplier relationship.

4.9 : ESI and Performance

Model	R	R Square	Adjusted R Square
1	0.796	0.633	0.538

ANOVA a

Model	Sum of Squares	df	Mean Square	F	Sig.
Regression	9.937	1	.585	6.608	.000
Residual	5.750	83	.088		
Total	15.687	82			

Coefficients a

Model	Unstandardized Coefficients	Standardized Coefficients	t-value	Sig.
(Constant)	1.043		2.382	.000
supplier involvement	-0.0219	-0.067	2.2687	.000
supplier relationship management	0.1156	0.1161	2.1576	.000

b. Predictors: supplier involvement and supplier relationship management
Dependent Variable: Performance

Research Data, 2024

Results show R square value of 0.796 which indicated a strong positive linear relationship between supplier selection, supplier relationship management and R squared of 0.633 which meant that 63.3 % of variation in performance of TARDA agricultural projects was explained ESI. The P value had a value of .000 which was less than 0.05 significance level implying that the model was fit to predict the relationship. All the beta coefficients were significant (P= .000) and for every unit of supplier selection there was a decrease in performance of -0. 0219 units. For every unit increase of supplier relationship management, performance increased by 0.115 units. Therefore, revising the model $Y= \beta 0 + \beta_1 X_1 + \beta_2 X_2$ become, $Y= 1.043 – 0.0129 X_1 + 0.1156X_2$

4.4 Discussion of key findings

Supplier selection had an SD of 0.532 meaning that the responses given by the respondents were within one standard and did not show much variation. The overall mean was 4.275 which suggested that respondents agreed with what the items described. Therefore, the management invested in supplier selection process. Successful supplier selection plays an essential role in procurement of inputs because it leads to accessibility of suitable inputs that

are delivered on time at acceptable costs. Supplier selection can identify suppliers capable of providing innovative solutions, assist buyer in risk management, observe ethical standards, and may also add value to sustained long-term acquisition of inputs.

When assessing statements on the supplier relationship management, SD of 0.479 and an overall mean of 4.28 were obtained. The findings indicated that the responses did not vary beyond one standard deviation and therefore they agreed that supplier relationship management was and important practice when implementing TARDA agricultural projects.

The prediction values were, for every unit of supplier selection there was a decrease in performance of -0.0219 units and for every unit increase of supplier relationship management, performance increased by 0.115 units. Therefore, ESI explained 63.3 % of variation in performance of the agricultural projects of TARDA and 36.3% of performance was explained by other factors that were not considered in the study. The contribution of supplier selection of -0.0219 can be explained by the fact that in supplier selection processes, there are costs incurred in the process of searching for suitable suppliers. Therefore, revising the model; $Y= \beta_0 + \beta_1 X_1 + \beta_2 X_2$ become, $Y= 1.043 – 0.0129 X_1 + 0.1156X_2$

5.0 Summary, Conclusions and Recommendations

The study set out to investigate whether ESI had any significant influence on performance of TARDA agricultural projects. The independent variable was operationalized by supplier selection and supplier relationship management which led to formulation of the objectives that guided the study in determining whether these constructs had a relationship with performance of TARDA agricultural projects. The unit of observation was identified as 90 staff of TARDA from senior procurement, finance, projects and stores clerks who provided all the data that was required to answer the study question. The descriptive analysis was done by application of mean and standard deviation, whose results showed that TARDA involved suppliers in supplier selection processes and supplier relationship management processes. Determination of correlation of variables indicated that a positive linear relationship existed with performance which led to a further assessment as to whether ESI predicated performance of agricultural products of TARDA. The results indicated a negative coefficient of supplier selection implying that TARDA incurred some cost in the supplier selection process. There was a positive relationship between ESI through supplier relationship management that predicted performance of agricultural projects of TARDA.

Recommendations were that, management of TARDA can scale up ESI in the current and future agricultural projects and the related sectors can use the findings to improve on similar projects. At policy level, government can formulate policies that would enable agencies operating in different geographical environments to be involved in agricultural and environmental projects apart from their core mandate. This will assist the local community by utilizing the resources available for economic purpose. The study recommended that further studies can be carried out in project operations management, role of stakeholders in the government agency related projects as well as other supply chain practices and their influence on performance.

References

Arshed. N,, Hameed. K & Sahe, A.(2022). An Empirical Analysis of Supply Chain Competitiveness and Cleaner Production. DOI: 10.1177/21582440221130297 journals.sagepub.com/home/sgo

Bhamu, J.& Singh Sangwan, K. (2014). Lean manufacturing: literature review and research issues. *International Journal of Operations & Production Management*, *34*(7), 876-940

Diabat, A.& Al-Salem, M. (205 C.E.). An integrated supply chain problem with environmental considerations. *International Journal of Production Economics*, *Volume 164*. https://doi.org/doi.org/10.1016/j.ijpe.2014.12.004

Ellram, L. & Tate, W. L. (2015). Redefining supply management′ s contribution in services sourcing. Journal of Purchasing and Supply Management, 21(1), 64-78.

Fiati, H. M. (2019). *Sustainable Procurement Practices and Operational Performance of Manufacturing Firms in Ghana* (Doctoral dissertation, UCC).

Gavirneni, S. (2002). Information flows in capacitated supply chains with fixed ordering costs. Management science, 48(5), 644-651.

Günay, K. A., Ceccato, T. L., Silver, J. S., Bannister, K. L., Bednarski, O. J., Leinwand, L. A. & Anseth, K. S. (2019). PEG–Anthracene Hydrogels as an On-Demand Stiffening Matrix To Study Mechanobiology. Angewandte Chemie International Edition, 58(29), 9912-9916.

Gupta, A., Agarwala, S., Sreenivas, V., Srinivas, M., & Bhatnagar, V. (2017). Primary definitive procedure versus conventional three-staged procedure for the management of low-type anorectal malformation in females: a randomized controlled trial. *Journal of Indian Association of Pediatric Surgeons*, *22*(2), 87.

.Hamid, A. B. A. (2006). The Impact of Purchasing and Early Supplier Involvement (ESI) in a Manufacturing Firm. *Universiti Teknologi Malaysia*.

field of research. *Journal of Purchasing and Supply Management*, *28*(2), 100768.

Kamalahmadi, M. and Parast, M.M. (2016). A review of the literature on the principles of enterprise and supply chain resilience: Major findings and directions for future research. International Journal of Production Economics, 171, 116–133.

Kiggundu, A. K. (2018). *Early Supplier Involvement and Organisational Performance in A Manufacturing Company: A Case Study of Mukwano Industries, Kampala-Uganda*. Kampala International University.

Kimwaki, B. M. (2022). Early Supplier Involvement and Supply Chain Performance in Food and Beverage Processing Companies in Kenya. *RS Global Sp. z O.O., Poland*. https://doi.org/10.31435/rsglobal_ijitss/30122022/7875

Kombo, K. D.& Tromp, D. L. A. (2006). *Proposal and Thesis Writing*. Paulines Publication Africa.

Kothari, C. R. (2004). *Research methodology: Methods & techniques*. New Age International (P) Ltd., Publishers.

Manavalan, E. & Jayakrishna, K. (2019). A review of Internet of Things (IoT) embedded sustainable supply chain for industry 4.0 requirements. *Computers & Industrial Engineering*, *127*, 925-953.

Mandal, P. C. (2022). Managing New Product Development: Strategies and Initiatives. *International Journal of Innovation in the Digital Economy (IJIDE)*, *13*(1), 1-11.

Meriläinen, S. (2018). Development of Early Supplier Involvement (ESI) Process – Study for a Case Company. *Oulu University of Applied Sciences*.

Mugenda, O.M. & Mugenda, A.G. (2003). *Research methods quantitative & qualitative apporaches*.

Mukherjee, K. (2017). *Supplier Selection: An MCDA-Based Approach* (1st ed. 2017). Springer India: Imprint: Springer. https://doi.org/10.1007/978-81-322-3700-6

O'Brien, J. (2022). *Supplier relationship management: Unlocking the value in your supply base* (Third edition). KoganPage.

Oktapia, A., Siagian, H. & Tarigan, Z. J. H. (2022). The Effect of Early Supplier Involvement on Firm Performance through Teamwork and New Product Development. *Surabaya, Indonesia*, 5(1), 1-8.

Oyola, A. (2017). A Support System for managing Early Supplier Involvement in New Product Development. *Delft University of Technology*.

Uitto, M., Jokikokko, K. & Estola, E. (2015). Virtual special issue on teachers and emotions in Teaching and teacher education (TATE) in 1985–2014. *Teaching and teacher education*, *50*, 124-135.

Wachiuri, E.W. (2015). Role of Supplier Development on Organizational Performance of Manufacturing Industry in Kenya; A Case of East Africa Breweries Limited. *Jomo Kenyatta University of Agriculture and Technology, Kenya*, *Vol. 3 No. 3*.

Zidane, Y. J. T., & Olsson, N. O. (2017). Defining project efficiency, effectiveness and efficacy. *International Journal of Managing Projects in Business, 10*(3), 621-641.